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(54) A surge station.

(57) A surge station adapted to successively displace products or groups of products (5) between two processing or operating units comprising an alternately controllable discharge (2) and/or supply (1) device and a surge means (7) applied in the path of travel of products or groups of products between two operating units. Said surge means can be put into operation in phase with the flow of products between the two operating units.

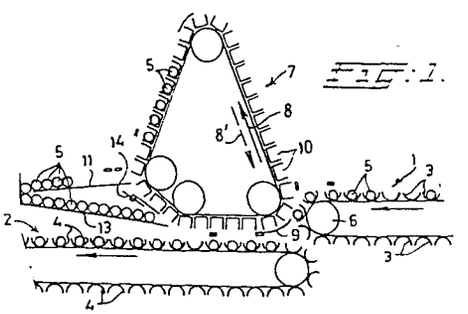

Fig. 1.

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A surge station.

The invention relates to a surge station adapted to successively displace products or groups of products between two processing or operating units.

In successive machining operations or by aligning processing machines having a production line between them, problems often occur as to adapting the machine steps or the steps of the processing units to one another. A deceleration or even an interruption in the productive capacity of one of the operating units during a certain period of time, will actually hamper the cooperation between said two units and thus the continuity of the flow of products between said two operating units. When a first operating unit is unable to deliver products to a second operating unit, due to an accidental interruption, said second operating unit is also unable to operate any longer. When, however, the second operating unit is unable to operate during a certain period of time, the situation will get more complicated as the first operating unit will continue the supply of products to the second operating unit, so that a build-up of products will occur. Said build-up is mostly manually removed and temporarily stored, which is rather expensive. The result of the latter is that the two operating units are mostly

put to a stand still.

The wording "operating unit" covers in this respect also a productive or processing machine.

It is a primary object of the present invention to alleviate the above-identified problems and in accordance with the invention, this is attained by providing a surge station for products or groups of products which have to be displaced successively between two operating units.

A surge station according to the invention is provided with a device comprising surge means and/or a discharge and supply device which are selectively controlled, said device being accommodated in the path of travel of the products between two operating stations, the surge means for the supply and/or discharge device being connected in phase with the flow of products between the two operating units.

The use of a surge station in accordance with the invention has the beneficial result that any problem concerning temporary differences in capacity between a product supplying machine and a product receiving machine can be obviated if an interruption in the operation of one of said machines occurs. In accordance with the present invention the surge means is therefore adapted as a store, comprising successive storing accommodaticns for products or groups of products.

In a practical embodiment the surge means forming a store and being part of the surge station, is a conveyor, the operating direction of which making an angle with the conveying direction in the path of travel of the products between the two operating units.

The surge station need not necessarily be disposed directly between two operating units or processing machines, but according to the invention said surge station should preferably be positioned such, that the conveyor functioning as a store is disposed at the end of a supply conveyor for products or groups of products, while the storing accommodations of the conveyor functioning as a store are able to cooperate with storing compartments provided upon the supply conveyor. Preferably the conveyor functioning as a store should cooperate with a discharge conveyor.

If presently the operation of a product receiving machine is interrupted for some time, the products being supplied by a first machine may be stored in the storing accommodations of the surge means functioning as a store. As soon as the product receiving machine is able to continue its operation, the flow of products can be continued in a normal way; in case of a temporary interruption in the operation of a product supplying machine, products from the storing accommodations in the surge means functioning as a store, may be delivered to the product receiving machine.

The present invention will be illustrated with respect to an embodiment in the drawing, wherein:
Fig. 1 shows a diagrammatical side view of a supply and a discharge conveyor in between which a surge station is accommodated;
Fig. 2 shows a diagrammatical side view of a surge station, in an embodiment differing from that of fig. 1, and
Fig. 3 shows a perspective view of part of a surge station as diagrammatically shown in fig. 2.

A supply conveyor 1, cooperating with a discharge conveyor

2 is disposed between two operating units in the path of travel of the products. The operative direction of the conveyors 1, 2 is illustrated by arrows in the lower half of fig. 1. Said conveyors consist of endless belts or chains, the conveyor 1 being provided with storing compartments 3 whereas conveyor 2 comprises storing compartments 4, e.g. in the form of margarine cups can be disposed. Said margarine cups which are, for instance, produced by an operating unit (not shown) are fed to the compartments 3 of the conveyor 1 and may be previously nested into one another in order to facilitate a transport for a further processing, so that they then form a group of products. At the end of conveyor 1, at the location of the return roller 6, the group of products 5 will land in the compartments 4 of the conveyor 2 which is not only considered to be a discharge conveyor in the path of travel of the products, but also as a supply conveyor for a further operating unit. In case of margarine cups the further operating unit may be a printing machine adapted to provide the cups with a printing.

It will be obvious that in case of an interruption in the operation of the printing machine and the cup-supplying machine continuing its operation, a build-up of products will occur in the path of travel between the two operating units. In order to terminate and quickly remove said build-up a device comprising a surge means is provided, referenced in fig. 1 by numeral 7. The device 7 comprises an alternately controllable discharge and supply direction as is shown in the drawing by the arrow 8 and the dotted arrow 8', whereby arrow 8 illustrates the discharge direction, whereas dotted arrow 8' illustrates the supply direction. The function of said supply direction, illustrated by means of arrow 8', will be elucidated hereinafter. Figure 2 shows the same

/into which compartments products or groups of products 5,

situation as figure 1, the numerals corresponding to those of figure 1, the discharge conveyor being, however, not visible, said conveyor being seperately described hereinafter. In the embodiment of figure 1 the surge means is made operative by displacing a partition 9 and by driving a conveyor functioning as a store, being carried out thus that the surge means 7 is a store with successive storing accommodations 10 for products or groups of products, whereas the operative direction, in accordance with arrow 8, makes an angle with the conveying direction in the path of travel of the products or groups of products between the two operating units. It will therefore be obvious that the conveyor 7 with storing accommodations 10 for products or groups of products 5 is adapted to convey said products or groups of products parallel with a vertical plane. When the partition 9 in the chute for the products or groups of products is led from conveyor 1 to conveyor 2, products or groups of products will fall from the compartments 3 into the storing accommodations 10 of the conveyor 7 functioning as a store, at the end of the supply conveyor 1.

The storing accommodations 10 of the conveyor 7 functioning as a store, therefore cooperate with the compartments 3 provided upon the supply conveyor 1 so that the surge means for the supply and discharge is connected in phase with the flow of products between the two operating units. The products or groups of products 5 are then conveyed in an ascending manner and dependent upon the period of stand still of the second operating unit, all storing accommodations 10 or parts thereof will get filled. When all storing accommodations 10 are filled and the period of stand still of the respective machine still continues, the products 5 or groups of products 5 will arrive upon a stacking platform 11, from

which they can be removed manually. The capacity of the conveyor 7 in the form of an elevator chain or belt is, however, so great, that during a small period of stand still of the second operating unit, said stacking platform 11 need not be used. In the embodiment of the surge station according to figures 2 and 3, the storing accommodations upon the conveyor 7 functioning as a store, are adapted to function as passages for the products from the supply conveyor 1 towards a discharge conveyor 2' (fig. 3), being under an angle with respect to the supply conveyor. The products, and in the present embodiment, the groups of products, will land from the compartments 3 into the storing accommodation 10' under the influence of the return roller 6, as under normal conditions, when the two operating units are both functioning in an uninterrupted manner, the conveyor functioning as a store, will stand still. An ejecting member 12 is disposed sidewise of the storing accommodation 10'; said ejecting member 12 may for instance be a pneumatic cylinder-piston system. The ejecting member ejects groups of products 5 through the storing accommodation 10' upon the discharge conveyor 2' which subsequently supplies said products to a second operating unit, e.g. in the form of a printing machine.

It will be obvious that the surge means may be controlled entirely automatically, the operating units or the conveyors being provided with detectors, if necessary, which detectors energize a logical system for carrying out the various functions of the respective devices. The use of detectors is known in practice and need not be elucidated. It will also be self-evident that the surge station according to the invention may also be active when an interruption will occur in the path of travel of the products between the two operating units, for instance due to a product or a group of products falling

out of a compartment, this even at the event that the two operating units function normally.

The respective action of the surge station is so carried out in the embodiment of figure 1, that together with platform 11 an auxiliary platform 13 is provided, comprising a slide 14. When the slide 14 releases the products resting upon platform 13, a storing accommodation 10 will slide a product from said platform 13 and will depose said product or groups of products upon a compartment 4 of the discharge conveyor 2. The logical system accurately controls the steering direction, so that a product or a group of products will always land upon an empty compartment 4. If the operating unit supplying the products or groups of products upon the supply conveyor 1, comes to a stand still, the discharge conveyor 2 can be fed in the above identified manner. Dependent upon the number of storing accommodations 10, surge means in the form of a conveyor may also operate in the direction of arrow 8', so that the products or groups of products will fall upon the discharge conveyor 2 along the partition 9 as long as any products or groups of products still remain in the storing accommodations 10. Said feedback system is also used in the surge track shown in figures 2 and 3, the surge means in the form of a conveyor being moved towards the direction of arrow 8", in order to have storing accommodations 10 filled with groups of products, disposed in front of the ejecting member 12, so that said groups of products can be accommodated upon the discharge conveyor 2'. Should the number of storing accommodations 10 be insufficient for a subsequent filling of the discharge conveyor 2', the products or groups of products have to be manually accommodated upon the auxiliary supply platform, so as to fill fresh storing accommodations 10. It should be noted, however, that similar long stand still periods of

one of the operating units, e.g. a machine for supplying margarine cups or a machine for printing them, will seldom occur when the respective machines or machine will operate normally.

It will be clear from the foregoing that the provision of a surge station in accordance with the invention will prevent a stand still of the production line if one of the operating units, for instance in the form of a supplying or receiving machine, will come to a temporary stand still, e.g. due to a malfunction of the respective unit or due to another accidental interruption.

Claims:

1. Surge station adapted to successively displace products or groups of products (5) between two processing or operating units,
characterized in
that a device is provided comprising an alternately controllable discharge (2) and/or supply (1) device and a surge means (7), which device has to be applied in the path of travel of the products or groups of products between the two operating units, the surge means (7) for the discharge and supply being connected in phase with the flow of products between the two operating units.

2. Surge station according to claim 1, in which the surge means (7) functions as a store, comprising successive storing accommodations (10) for products or groups of products (5).

3. Surge station according to claims 1 and 2, in which the store forming the surge means is a conveyor (7), the operative direction of which making an angle with the conveying direction in the path of travel of the products or groups of products (5) between the two operating units.

4. Surge station according to claims 1 - 3, in which the conveyor (7) with storing accommodations (10) for products or groups of products (5) is adapted to a conveyance parallel with a vertical plane.

5. Surge station according to claims 1 - 4, in which the surge means (7) in the form of a conveyor

functioning as a store, is disposed at the end of a supply conveyor (1) for products or groups of products, the storing accommoations (10) of the conveyor (7) functioning as a store, being able to cooperate with compartments (3) upon the supply conveyor (1).

6. Surge station according to claims 1 to 4, in which the surge means (7) in the form of a conveyor functioning as a store, cooperates with a discharge conveyor (2, 2').

7. Surge station according to claims 1 to 6, in which the storing accommodations (10) upon the conveyor (7) functioning as a store, have the form of passages for products or groups of products from the supply conveyor (1) towards the discharge conveyor (2), being disposed under an angle with respect to the supply conveyor.

8. Surge station according to any one or more of claims 1 to 4, in which the surge means (7) comprises a separate discharge station (10') for products or groups of products, beyond the path of travel between the two operating units.

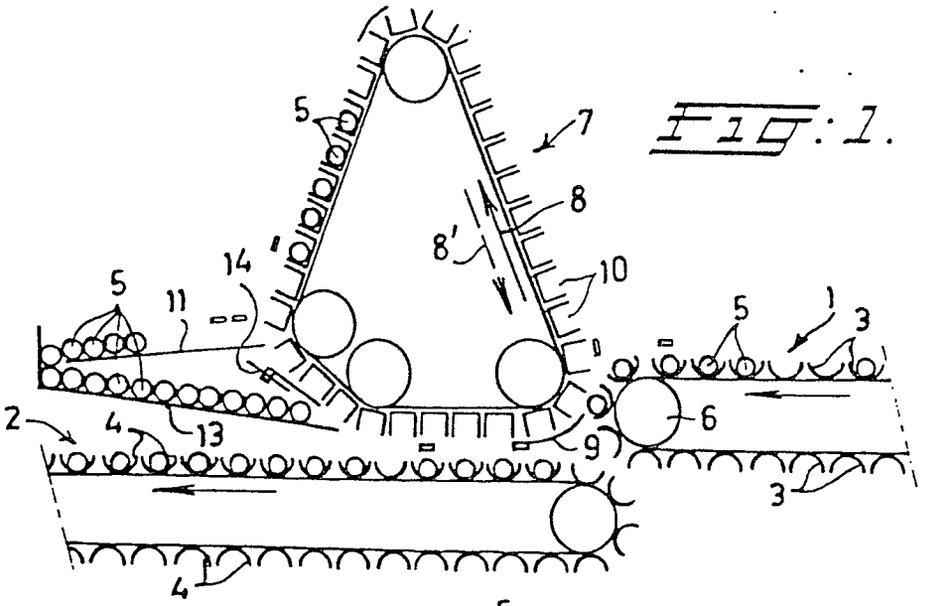

Fig. 1.

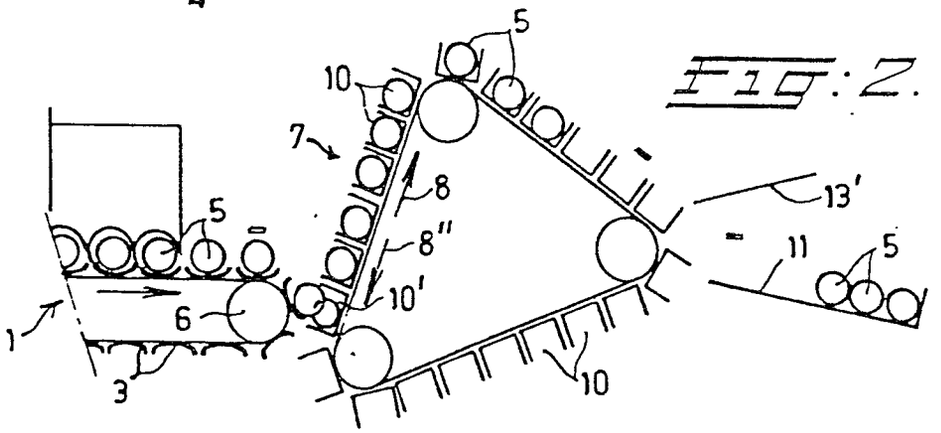

Fig. 2.

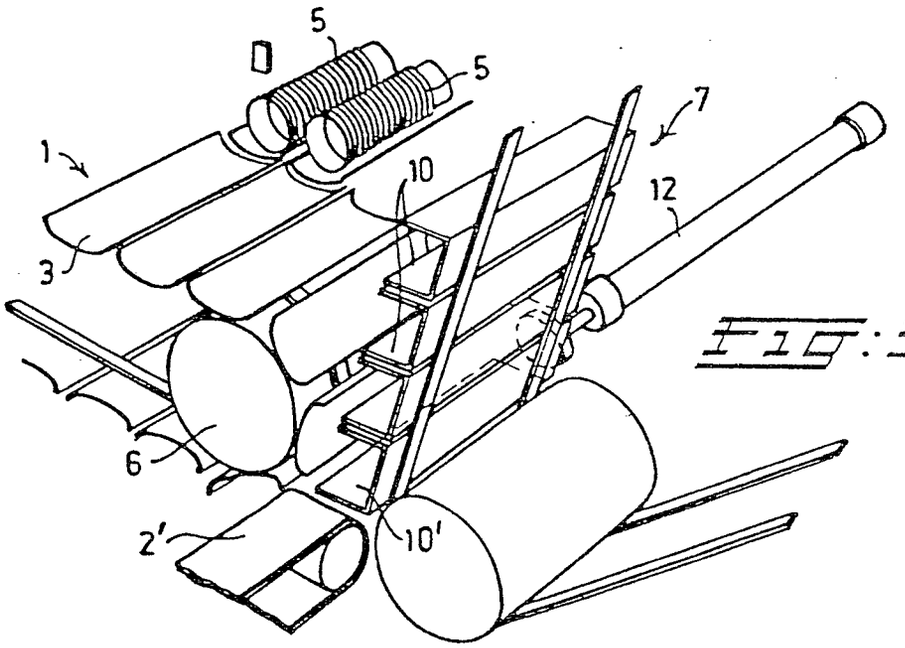

Fig. 3.

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EUROPEAN SEARCH REPORT

Application number
EP 81 20 0239

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	US - A - 3 470 996 (LEE) * Column 3, lines 47-75; column 4, lines 1-75; column 5, lines 1-26; figures 1-4 *	1-4,6
X	AT - A - 309 300 (WOLF) * Page 3, lines 47-60; page 4, lines 1-40; figures 1-4 *	1-4,6

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

B 65 G 47/51

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

B 65 G

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	09-06-1981	OSTIJN